

Perspectives on Sustainable Agriculture:
Sustaining Agribusiness in a Changing Rural Environment

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Agriculture is an evolving industry -- it responds to market forces, to improvements in technology, to government programs. We also see changes as a result of new technologies, improved information about how to efficiently raise crops and livestock, and more integration with other sectors of society. In agriculture, as in any business, to stand still is to fall behind the rest of the industry. We need to be ready to adapt to change, to face new realities, and even to initiate change in positive directions.

One growing reality is the interdependence of agriculture with other industries and an increased demand and competition for energy, for labor, and for capital. Although we are relatively efficient in the use of fossil fuels and irrigation water, the returns in agriculture to these resources are far less than in other industries. Thus their prices tend to increase and add to the cost of farming as we continue to develop more input intensive practices.

Another reality is the concern which most citizens have about air and water quality, pesticide residues, and general quality of life. There is an increasing awareness of the role that modern agriculture plays as a source of some of the most publicized problems in our environment. Today we no longer farm in isolation from the rest of society. Natural resources are here for everyone, and increasing government regulations will assure that we move toward a cleaner environment for ourselves and for future generations. The title on the program states "Perspectives on Sustainable Agriculture: Where it Fits and Why?" A better question would be, "Is there anywhere in the U.S. where we should not move toward a more resource efficient, environmentally sound, and sustainable agriculture?"

Goals of Agribusiness

Let's start with three assumptions about the goals of agribusiness in the U.S.:

- business exists to provide services to the American farmer, and those services include products which enhance productivity.
- agribusiness requires reasonable profits to remain active in this industry, otherwise capital will go elsewhere.
- commercial agribusiness will only be as successful as the farmer clients who purchase the offered services and products.

If we can continue to satisfy these goals over the long term, it is likely that agribusiness will continue to serve farmer clients well. But these goals need to be pursued in light of changes in consumer demand, in government regulations which influence our specific production practices, and in rural and urban concerns about health and safety in the farming industry as well as long-term environmental effects of agriculture. In many respects, we are all becoming better informed about our global environment and the things we need to do to sustain life into the future. Agriculture has to be a vital part of that future.

What is Sustainable Agriculture?

In our Nebraska extension talks we have defined this area as "a management strategy which helps the producer to choose hybrids and varieties, a soil fertility package, a pest management approach, a tillage system and a crop rotation to reduce costs of purchased inputs, minimize the impact of the system on the immediate and the off-farm environment, and provide a sustained level of production and profit from farming." There are a number of other definitions around, including a more philosophical one from R. R. Harwood: "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use and a balance with the environment that is favorable both to humans and to most other species." We see this as an evolving concept which will grow and change as more information becomes available about biological systems and how we can modify them to our use.

The current federal initiative and funding to promote "low-input, sustainable agriculture" in research and extension has led to more interest by those in universities and private research groups, as well as more concern by agribusiness. The use of "low-input" in the term is unfortunate. Many researchers (both public and private) are involved with research to find more efficient N use, greater insect or disease tolerance, or weed control with lower rates or more benign chemicals. In each case there may be a recommendation for lower input of specific products. Yet few of these proponents of sustainable agriculture would suggest that "low input" implies low output or especially low management skills. In fact reducing inputs requires greater management expertise, better education, and more appreciation of how the total system functions. Let's explore some examples.

Providing a Fertile Soil

The objective of a fertility program is to provide what the plant needs to produce an acceptable yield -- and fertility can be achieved through chemical fertilizers, animal or green manures, crop rotations, irrigation water. We obviously use a combination of these each year. It is not profitable to apply excessive amounts of fertilizer just to be sure that we are not "short". To avoid negative financial and environmental consequences in fertility, we need to base yield goals on a five year average yield for each field, take

deep soil samples, obtain credible laboratory results, calculate and give credit for all sources of N and other elements in the system, and conservatively interpret test results in terms of what is needed for the next season.

We advise farmers to apply only that amount of each nutrient which will give an economical yield increase, even if that means mining the soil for nutrients. The cliché that "good managers use more fertilizer" today is clearly a myth -- good farmers use precisely the fertilizer needed by the crop. Rotations, use of animal manures where possible, and carefully adjusting yield goals to fit the reality of each field and the probability of rainfall in each season can lead to the most consistent profits. Better use of available nutrients by crops and elimination of excessive applications can help reduce levels of pollutants in the groundwater and surface runoff.

Pest Management Alternatives

An alternative to the concept of "pest control" is pest management. The research on integrated pest management over the past two decades has brought biological principles into our understanding of systems and how to better deal with unwanted species in the field. One of the first steps in evaluating pesticide use is careful field scouting. Good records on what weed species are in a field can help the farmer design the least cost approach for the next year. The right interpretation of these records can lead to decisions on which crop rotations can be used to help control weeds. Reduced cost approaches include band application followed by cultivation, use of rotary hoe and cultivation, and rescue treatments after the nature of a weed problem in a given year has been determined. Ridge tillage with band application has been especially effective for some producers. Each of these alternatives can help reduce costs and leaching of undesirable chemicals or breakdown products.

We are learning more about allelopathy, the effects of leaves, stems or roots of one plant on others in the system. Sorghum and rye are two crops which seem to have particularly strong allelopathic effects on some other species. This is a "natural" type of control which can be used to supplement other approaches.

Most insects can be controlled by crop rotation, careful choice of newer varieties and hybrids, and in some cases by biological control. For example, corn rootworm rarely is a problem in first year corn, even in a two-year corn--soybean rotation. Even in continuous corn, careful scouting the previous year can help the farmer identify which fields or sections of fields are likely to have a serious problem which requires control at planting time. Industry has responded to farmer concern about the effects of pesticides with new products which are biologically-derived, used in ultra-low volumes, and which are more specific in their biological targets. This is important to help us build up the populations of desirable insect species and bring greater stability to the system.

Environmental Concerns

We hear urban voters and legislators attacking agriculture, farmers, and agribusiness about a lack of concern about the environment. They contend that we are only interested in profits, but most often they are wrong! All of us who work in agriculture are on the front lines -- we are the ones who deal directly with pesticides and fertilizers in the mixing and application of products. In the rural environment, we are the first to drink from a well contaminated with nitrates from excess fertilization, the first to consume vegetables covered with pesticide from drift, the ones most likely to suffer from health hazards associated with these products. It is up to all of us to make the system safer, and it is folly to suggest that farmers don't care about their environment.

Today we are besieged by regulations in farming, and this is likely to grow more intense as people become more informed about the products we use in agriculture. Although we have a long way to go, we can help the situation by only applying precisely what is needed and where it can be used effectively and economically to help grow a crop. This is one of the foundations for a sustainable agriculture. One thing is for sure -- the solutions to these environmental problems which we can generate within the industry are solutions we can live with, and these are far more desirable than solutions which are dictated to us by others who don't understand farming.

Sustaining Agribusiness

If we return to the three assumptions about agribusiness -- that we provide a service to farmers, build in a reasonable profit, and assure that we help farmers to stay in business for the long-term -- it is easy to see why we all need to work toward a more sustainable agriculture. There is a well-founded concern about some of the products and practices which have been used in the past. We need to correct these problems and seek new products which will be more environmentally benign. It's also important to better understand the total biological system and how we can safely integrate some products into the system with minimal effect on beneficial organisms. We can use crop rotations, careful management of renewable "internal" resources on the farm, and better fine tuning of production decisions to make farming a safe and sustainable livelihood for the farmer. This is also in the best interest of agribusiness. There is no reason why we should not bring our resources together to search for a truly sustainable system to produce food, fiber, and other products for the future.

Note: Several sections were taken from "Search for a Sustainable Agriculture", Crops & Soils, Aug-Sep, 1987 (pp. 12-14).